A Dissertation
On
Generation

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by.

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Generation.

Few subjects in Physiology have afforded a more extended field for the ingenious speculations of Philosophers than that of Generation and few have afforded stronger evidence of the various & opposed results of human investigation.

The multiplied hypotheses on this subject only go to shew the existence of an almost innate principle that would explain the modus operandi of every function and operation of nature both moral & physical.

Had Philosophers confined themselves to the investigation of attainable facts and left untouched the inscrutable laws of Providence science would not now be burdened with that load of hypothetical rubbish which must be removed or avoided before it can make any proficient advancement.

The greatest obstacles to the progress of physiology are the glittering hypotheses of men who seem to delight in dazzling our eyes and leading us every step into "darkness more gloomy and paths more inextricable" These hypotheses are like those deceitful lights which sometimes divert the unwary traveller from the right path into marshes thickly covered with impenetrable obstacles

Though vain hypotheses act so pernicious ly upon Philosophy we would not with some others condemn all Theory and renounce every thing as useless which is not the immediate result of experience Theories built upon facts & analogy are entitled to our attention and deserve to be treated with all the respect that the importance of the subject demands.

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No science can make much advancement, or indeed hardly exist without theory and those merely mechanical members of the profession who would make our science a trade can at most, do no more than corroborate by their experience the inductions of others.

As man is hourly exposed to the noxious influence of a thousand different causes opperating to deprive him of a precarious existence it became expedient that some provision should be made to fill up the blanks produced by the invasions of Death the great scourge of animate creation. That function with which the God of nature has provided man for the fulfillment of the above design is denominated Generation

The parts of generation in the human species both male and female are so well known that it would be superfluous to occupy time in enumerating & describing them. At a proper period of their developement a certain propensity is acquired leading to the performance of an act necessary to the consumation of their original design.

Though in the investigation of this subject we are more particularly concerned with the physiology of the human system. the facts gathered from experiments made on other animals bearing a resemblance in their genital organs may be brought forward to explain the changes which take place in the human female. The experiments of the celebrated De Graaf afford up an accurate and minute account of the appearances presented by rabits at different periods after coition.

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On opening one of these animals 1/2 an hour subsequent to coition nothing remarkable was discovered except that the cornua of the uterus had acquired something of a redish hue and the ova in the ovaries were divested in a slight degree of their transparency.

Six hours after coition dissecting another he observed that the tunicles of the ova appeared redder than usual and on puncturing them with a needle there issued forth a viscous pellucid liquor followed by a discharge of blood from the sanguiferous vessels ramifying in their texture

Twenty four hours after coitus the changes wrought in the generative organs were very striking. the tunics of three ova in one and five in the other ovarium were opaque and of a pale redish hue. on their surface were seen numerous prominences like papillæ and when cut into they exhibited in the middle a smale quantity of limpide fluid but around the circumference a redish matter of more consistence. He examined another twenty seven hours after copulation and found that the cornua of the matrix together with the oviducts were bloody and that the latter embraced the ovaria on every side like the mouth of a funnel. About the centre part of the surface of the tunics there were as in the preceding case small papillary eminences through which upon pressure a clear liquor started out and afterwards a sanguineous coloured fluid of denser consistence.

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No ova were discovered on inspection in the cornua of the uterus but the rugose internal membrane of the latter was slightly thickened

Forty eight hours after coition seven tunics in one ovarium and three in the other were in the same state of mutation as was observed in the foregoing experiments. The papilla however were more projecting and when the ovaria were gently squeased permitted the escape of an albuminous fluid which was not succeded as before by the evacuation of a redish matter

Fifty two hours after coition did not exhibit so many tunics altered as in the former instances. Connected with these he perceived a small glandulous substance in which was a small cavity, seeing no fluid in this he suspected that the limpid matter envelopped by its membranes had been detached & expelled he therefore carefully searched the oviducts and cornua but unsuccessfully.

After the lapse of seventy two hours he inspected another "quæ nobis longe aliam et maximè miranda mutationem exhibuit" the infundibulum which on every side closely invested the ovaries being retracted, three tunics a little larger and harder than those before witnessed presented themselves to view on the summit of each a papilla pierced by a delicate foramen exposed a smale cavity entirely empty. He therefore attentively inspected again and again the passages by which the ova should escape and at length found in the middle of the right oviduct one and in the remotest part of the cornu of the same side

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two extremely minute ova. these were enwrapped by a very delicate double envelope which being punctured discharged a very limpid fluid.

In another experiment four days after coition he observed the same changes though in a greater degree. The ova which had acquired the greatest magnitude being about twice the size of those in the preceding case

Experiments five and six days after coitus shewed the same alterations though more conspicuous

Dissection seven days from coition exhibited diaphanous cellulæ in different parts of the matrix from which when laid open were extracted several ova whose circumference measured 9/10 of an inch. In these nothing was seen but the interior tunic which was very evident and an extremely limpid liquor.

Eight days from coitus he perceived three of the cellulæ above mentioned. one of the two cellulæ contained in the left cornu was twice the size of its fellow. Having dissected the cornua the ova were opened to have acquired greater bulk. Several attempts were made to free them from their attachments and remove them for better examination, but all endeavours of this kind proved futile in consequence of the extreme tenuity and delicacy of the enveloping membranes some of the ova were then boiled with the uterus & became hard indicating the presence of albumen. The substance of the cellulæ at the part where the h-

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hypogastric vessels enter had become redder and more turgid. He next selected an old rabit whose ovaries are double the size of those in the young. dissecting this on the ninth day from coition he found in the right ovarium two and in the left five tunics or follicles which had been recently evacuated He likewise saw others becoming very pale which were judged to be the remnant of former impregnations. The cellula in the cornua answering to the number of emptied follicles were very prominent, and their substance was interlarded by a multitude of veins and arteries they were then laid open and the ova presented themselves to view as clear as chrystal. In the middle were observed very fine specks which had escaped detection in other experiments. The interior of the cellula or that part receiving the vasa hypogastrica exhibited now the rudiments of the placenta.

The tenth day from copulation the appearances of impregnation were still more clearly manifest he detected in the cellula the rudiments of the embryo. The placenta was seen very conspicuous with the ovum attached to the middle.

Continuing his experiments the twelfth day from coition the embryo had become so much developed that the limbs might be recognised. On the thoracic region two sanguineous spots were observable and the same number of white ones. A certain mucilaginous matter verging towards a red was here and there visible in the abdomen.

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Dissection sixteen days after coitus exhibited the cellulæ larger and the sanguiferous vessels more numerous and turgid. It was likewise ascertained that in proportion to the enlargement of the cellulæ was their mutual approximation and the diminution of their interstices. The membranes Amnion and Chorion were so intimately blended that it was almost impossible to seperate them. Upon rupturing them however a complete view of the embryo was obtained which presented the following appearances. The head was very large and diaphanous the eyes protruding the mouth gaping the ears might also be discerned. The spine was seen of a shining whiteness extending along the dorsum. On the sides might be seen very minute sanguiferous vessels whose branches ramified on the dorsum and reached to the feet. The two red spots observed in the preceding experiment in the pectoral region had become so large as to evidence plainly they were the rudiments of the ventricles the white points on each side of them indicating the situation of the lungs.

Opening the abdomen the first thing noticed was the Liver and then a small white body to which was attached a mucilaginous matter resembling entangled threads. The two latter appearances were the primordia of the stomach and intestines

His last experiment was performed the twenty ninth day from copulation. In the ovaries of the rabit were found eleven follicles evacuated.

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Progressing in his examinations to the matrix it was found devoid of cellulæ, but was so distended on all sides as (using the words of De Graaf) to present the appearance of a stuffed sausage. It was observed to possess an evidently undulating motion not unlike the peristaltic movement of the bowels. The parieties of the dissected uterus appeared not much thicker than in the unimpregnated state. In its cavity were contained eleven fœtuses which although enveloped seperately in a proper membrane were so involved together as to appear enclosed in a common chorion.

The accuracy & truth of the above experiments have been attested by the observations of subsequent writers

Having thus noticed the changes induced in the uterine system of rabits by impregnation we will avail ourselves of the observations which have been made in relation to this phenomenon in the human subject, and such as have been inferred from analogy.

Whatever feelings are experienced by the woman during coition whether effective or otherwise cease simultaneously with the emission of semen by the male

In an effective coitus the first organ that gives evidence of impregnation is the ovarium "twenty four or thirty hours after a productive coition (says Chaudelie) the vesicles of the ovarium which were most developed sensibly augment in volume. the tissue which surrounds them becomes more compitent & changed and changed to a greyish yellow.

In this condition the tissue over the enlarged vesicle takes the name of corpus luteum. The vesicle continues to increase until the second, third or fourth day; the corpus luteum also grows in the same proportion. It contains in its areola a liquid that is white opaque and analagous to milk. After this the vesicle ruptures the external tunic of the ovarium and is carried to the surface where it adheres by one of its sides."

"In bitches" says Magendie "large seum vesicles thus pass out from the ovarium which had attained the volume of an ordinary hazel nut. In this state they presented no appearance internally that can be considered a germ. their surface is smooth & the fluid they contain does not run into a mass as before fecundation. After the escape of the vesicle the corpus luteum remains in the ovarium presenting in its centre a cavity which is large in proportion as the period of conception advances but in time both the cavity and corpus luteum become diminished. This diminution however is very slow and the ovaria always contain some of preceding impregnations" a circumstance says Magendie which has always deceived observers.

Although it is an established fact that corpora lutea succeed impregnation it is by no means the fact that their presence is a demonstrative proof of conception. Many cases have been recorded where corpora lutea have been found in virgins whose hymens were so complete as to be capable of preventing impregnation and whose chastity no one would dare impeach. They are ascribed by some writers to a peculiar amorous disposition and a lively licentious

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imagination which is so ungovernable as to excite the uterine organs as strongly as the very act of coition thus producing the same appearance in the ovaries as results from a prolific impregnation. This explanation though ingenious is hypothetical and would seem indeed divested in some degree of its claim to our belief by the fact that such anomalous appearances have been exhibited in cases where this highly wrought venereal excitement could not occur. One of the most remarkable instances of this kind was published by Dr Baillie in the transactions of the Royal Society for 1789. A fatty substance, hair & the rudiments of four teeth were found in the ovarium of a child, twelve or thirteen years of age with an infantine uterus and entire hymen.

The next organ which evidences a successful impregnation is the fallopian tube.

As the action of this organ has been described by one who was himself an eye witness and a most accurate observer we cannot do better than transcribe what he has said concerning it "Among the developed vesicles on the surface of the ovarium there is generally one which adheres to the open and mucous mouth of one of these tubes, the tissue of which is softened and gorged with blood and presents a peristaltic motion. I have never directly detected the vesicle in the tube but I have often seen the vesicle after it was descended towards the inferior part of the horn of the uterus, while another has contracted adhesions with the extremity of the tube. At this moment the body of the tube was enlarged to nearly half an inch in diameter it of course was sufficiently large to allow the vesicle to pass.

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in traversing the tube in the human female has not been positively determined. According to Magendie & Mayguier saw the product of fecundation thrown off by an abortion on the twelfth day. it was a small vesicle filled with a transparent fluid. In a case related by Sir Everard Home there intervenes but seven days between the coition and the entrance of the vesicle into the uterus.

A period of about twenty days has been allotted to its passage by many Physiologists. Forty eight hours according to Cruickshanks is the term in rabits while Magendie alleges it to be three or four days and in bitches from six to eight. De Graaf as we have seen could detect no ova in the cornua of the uterus of the rabit till seventy two hours after coitus.

The ovum having made its entrance into the uterus the latter organ undergoes a variety of alterations fitted for the accomodation and preservation of the foetus These changes are witnessed in the size, situation and structure of the matrix.

During the three first months of gestation very little alteration is observed either in the position or dimensions of the uterus since it remains concealed in the cavity of the Pelvis. But in the fourth month it becomes more developed rises out of the pelvis and lodges in the hypogastrium. During the fifth. sixth. seventh and eighth months it enlarges in all directions gradualey encroaching upon the other viscera hence these become compressed and the intestines are crowded into the lumbar and iliac regions. At the end of the eighth month the fundus mounts up to the epigastrium but after this period it descends towards

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the umbilicus. The cervix uteri retains its original form during the seven first months of pregnancy giving to the uterus a conoid form. After this the cervix gradually dilates and finally becomes nearly effaced giving to the uterus an ovoid shape. The volume of the uterus at this period according to Haller is nearly twelve times that of its unimpregnated state.

While the uterus is undergoing these changes in bulk it results that its relation with the surrounding parts must vary according to the degree of these changes. Thus the ovaries confined by their blood vessels cannot accompany the uterus in its ascent hence they with the fallopian tubes remain attached to its lateral portion. The peritoneal envelope which forms the broad ligaments is stretched and the vagina is elongated.

The little resistance which is afforded by the round ligaments tends to direct the fundus uteri forwards a circumstance "which (says Magendie) must have a favourable effect upon the abdominal circulation by diminishing the pressure of the large vessels. In gestation as is evident the abdominal parieties are subject to great distention. hence by frequent pregnancies their resiliency is diminished and instead of assuming their original appearance they contract into wrinkles.

The alteration the structure of the uterus undergoes is no less remarkable and important than that of its volume and position. In proportion to the developement of the uterus is the decrease of the density of its texture. Its colour is changed from a pale to a deep red. and its now sponge like texture assumes a more obvious fibrous appearance

Longitudinal fibres may now be seen on the external surface passing from fundus to cervix intersecting at

right angles the circular fibres. Beneath this layer the uterine texture is so completely interwoven as to form a structure altogether inextricable and devoid of regular arrangement.

The organ in this state acquires a peculiar contractility which has been compared to the peristaltic motion of the intestines. (May not this motion depend upon the impulse derived from its increased vascular system?) While these important changes are taking place in the dimensions and structure of the uterus its internal surface is active in making preparation for the duties now devolving upon it." so soon as impregnation takes place and is perceived by the ovarium. the internal surface throws out through its whole extent a vascular tissue which from its being after a while cast off has received the name of membrana decidua. It serves as a connecting medium between the internal surface of the uterus and the ovum.

During the first months of pregnancy the decidua increases with the matrix but subsequently almost entirely disappears. The vascular system of the uterus becomes modified according as the preceding changes take place. Its small and convoluted vessels become straighter and greatly dilated in order to afford that abundant supply of blood required by its new functions depending upon the presence of the ovum. This last for some time after its introduction into the uterus remains free & unattached. Its bulk also remains stationary till about the second month when it begins to expand and send forth filaments which ramify with the decidua after the manner of sanguiferous vessels. The gradual increase of the ovum seems to crowd these vessels to one side where they attain a

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more considerable size constituting with the decidua what is called the Placenta.

The exposed surface of the ovum is covered with the decidua reflexa and a soft floculent coat. The ovum continues to increase untill the end of pregnancy at which period its volume equals that of the cavity of the uterus.

The membranes which the ovum brings with it from the ovarium now become more perceptible. the outer is called Chorion and the inner Amnion. this last contains in its sac the Liquor Amnii which increases in proportion to the developement of the ovum. In the second month of pregnancy there exists a small quantity of fluids between the two membranes which disappears during the third. The fluids contained in the ovum remains transparent without exhibiting signs of organization during the third weeks. About this time a slight cohesion between the ovum and uterus becomes apparent. "Soon (says Magendie) some points become more opaque and there are two distinct vesicles of nearly equal size united by a peduncle or kind of foot stalk; one of the vesicles adheres to the amnios by a small filament. About the same time there appears in the middle of the last a red point from which yellowish filaments are seen to pass off. this is the heart and principal blood vessels."

"At the commencement of the seconds month the head is visible the eyes forming two black points quite large in proportion to the volume of the head. Small openings indicate the place of the ears and nostrils. the mouth is at first large but contracts as the lips become developed which happens towards the sixtieth day; at this time the

ears nose and limbs are likewise perceptible."

"By about the end of the fourth month all the principal organs have become successively developed."

"At this time the embryo state ceases and the fatal state begins which is continued untill the end of pregnancy." Having followed the process of generation thus far we will leave it as any farther description would be an encroachment upon the precincts of Midwifery and unnecessary as regards the merely physiological view of the subject which we propose to take.

We will now proceed to investigate the theoretical part of generation. or the theories which have been invented to explain this almost inexplicable and mysterious subject. It is conceded on all hands that the semen is necessary to impregnation; but upon what part of the genital system it acts so as to effect complete conception is a point which has been agitated for ages and will be untill some favoured physiologist more happy than his predecessors settles the contest. One of the doctrines consists in the belief that the semen operates by that unknown something called sympathy or consent of parts. Another that the seminal fluid is taken up by a set of vessels destined for the purpose and conveyed to the ovaries. A third that it passes up direct through the uterus and fallopian tubes and in that way effects impregnation.

The first doctrine though supported by the authority of many eminent men and at first sight calculated to dazzle and please by its seeming beauty and ingenuity proves nothing. It wants support from experiment and reason and is only a beautiful fabric of the

imagination which covers our ignorance while the reason is going in search of materials to erect one of firmer and more durable consistence.

Though sympathy may exert an important influence over many of the actions in the human system, we are unwilling to acknowledge it invested with the power of creating human beings. The sympathies of the general system seem to operate through the medium of the nerves but that an impression made upon the nerves of the vagina should animate a germ in the ovaries can not from me receive the tribute of probability. An argument against this hypothesis which loses nothing from repetition is that it makes no provision for mules. nor explains the resemblance existing between parent and offspring. to which may be added the mulatto a product of white and black connexion. As well might we suppose that our system preserved its connexion with the material world as to suppose it endowed with life and brought into action by the same principle.

It is alledged that in birds no other than a sympathetic mode of conception can take place owing to the high situation of the ovaries. the existence of an infundibulum, the long and convoluted form of the uterus and the want of a penis in the male who merely deposits the semen within the vulva of the female and thus simultaneously fecundates all of the ova.

Now has it ever been ascertained by any experiments or observations made on these animals that impregnation and its consequences are the results of sympathy or that all the ova are impregnated at one tread of the male? if not the proposers of this argument

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are guilty of what is called a petitio principii they have assumed the very point in debate. It may be said however that the difficulty may impracticability of the semen gaining access to the ova is a sufficient proof of its validity. This leads us to consider another argument that has been employed in support of this doctrine. It is asserted that the diminution or loss of projectile power of the penis from stricture or diminution of length & the crassitude of the semen. Obstructions in the vagina the minute aperture of the vulva. the structure of the neck of the uterus and the dense gelatinous substance filling it up all conspire to afford an insuperable barrier to the passage of the semen

This argument stands thus because we cannot conceive how it is possible that semen should force its way through such a host of obstructions therefore it is impossible it should do it. Because we cannot understand how the semen should gain admittance into the uterus therefore such an occurrence is impossible. The inability to comprehend how a certain fact is possible reduces the existence of such a fact to an impossibility. Who does not perceive that the resistless force of experience annihilates the verity of the second proposition. The existence of ten thousands things daily compels our belief although it is impossible to account for their mode of being.

Why may not a peculiar vital action be instituted consentaneously in the vagina & uterus tending effectually to promote the passage of the semen. Such a conjecture more especially deserves our regards as it is no wise abscurant but supported by the most imposing analogy. As is well known by those who have devoted.

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a share of their attention to comparative anatomy that the vagina of the rabit together with the womb possess an evident peristaltic action. In a heat as it is called the former is in continual motion it shortens it lengthens it dilates it contracts incessantly. and that portion of it in the vicinity of the womb inclips their orifices so closely that it appears laid flat upon them.

It need hardly be remarked how well fitted is such an oconomy to assist the ingressive of the semen into the matrix. The belief that the uterus descends during the act of copulation is not so absurd and ridiculous an opinion as some would seem to intimate. but is entitled at least to a share of probability s there are strong grounds for believing that this really is the case and so long as actual experiment is not brought forwards to discards this opinion it stands upon as firm a foundation as the nature of the subject will admit.

The advocates of the sympathetic doctrine have adduced the experiments of Haighton in support of their belief. but any unprejudiced mind free from the bias of preconceived notions must acknowledge that there exists not a fact favouring in the least this doctrine carried to the extent it now is. Neither can a single fact be produced from Haightons observations which warrants the conclusion that the contact of the semen with the elements of the fetus is not requisite for their developement.

Haighton himself does not assert that the affusion of the semen on the rudiments is not necessary he only states " that the semen by its presence stimulates the vagina. os uteri cavity of the uterus or all of them.

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"The impression made is then propagated to the ovaries by consent of parts" in another place "the ovaries can be affected by the stimulus of impregnation without the contact of either palpable semen or aura seminalis?" It is manifest that if the contact of the semen in whatever manner be necessary to the evolution of the rudiments of the fetus all evidence against the fact derived from its apparent impossibility disappear. The semen then must be conveyed by some channel to its point of destination the ovaries. This channel some suppose to be a set of absorbents destined for the purpose a mere conjecture unsupported by analogy or reasoning and wanting confirmation from experiment. We cannot attempt a refutation of this doctrine unless its possibility which we admit be deemed sufficient grounds.

It is almost unnecessary to notice an hypothesis that the semen is absorbed into the general circulation and in that way applied to the ovaries. This is so unlike the economical plan which nature commonly pursues for the accomplishment of her designs that it alone would seem a valid objection against this doctrine. But to remove it merely upon such a pretext would be illiberal as it may be said that the very changes imposed upon the semen by this process are essential before it can facundate the ova. This argument however has been annihilated by the experiments of Spallanzani who has proved incontestibly that the actual contact of the semen itself is absolutely necessary to impregnation.

The last theory which we shall notice concerning this very intricate subject consists in the belief that the semen is immediately applied to the ovaries

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Those who would wish to discard this doctrine in toto over without qualification that many instances have occured where it was impossible that the semen could have gained access to the cavity of the uterus owing to a loss of projectile power in the penis from stricture. false passages debility &c.

This argument is based upon the assumption that the only mode by which the semen can enter the uterus is by an impulsive force. An assumption to which we by no means subscribe but whose falsity has been already pointed out. It is also alledged that conception has taken place although the vagina has been rendered impervious from adhesion of its sides the formation of a membrane or the growth of a tumour. conceding the occurrence of such obstructions it is highly probable that in many cases they may have been produced subsequent to impregnation

Closure of the os tinca from inflamation or removal of the same from the vaginal axis by obliquity retroversion &c are also brought forwards to disprove the possibility of the semen entering the cavity of the uterus.

To the last part of this argument the same reply is applicable as to the first objection it assumes that the semen can only reach the uterus by propulsion. Those cases of impervious os tinca may generally be explained upon the same supposition which obviates the second objection.

The experiments of the great Haighton though indicating somewhat against this doctrine by no means renders it invalid. He was not able to discover

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any thing satisfactory untile a frequent repetition of his experiments, performed with the greatest delicacy did exhibit some appearances of impregnation in the ovaries after the division of the fallopian tubes. But it must be confessed that these experiments are divested of any claim to certainty from the high probability that the tubes remained pervious after their division a sufficient length of time to allow the passage of the semen. His experiments to discover the erectile condition of the fallopian tubes necessary for the application of the semen to the ovaries are no more entitled to authority than the preceding as the very pain and irritation induced by the operation may have disturbed the regularity which nature otherwise pursues and suspended the effect of that stimulus which impregnation had begun

The truth of this doctrine receives considerable support from the frequent occurrence of extra uterine pregnancies an accident which can only take place by the direct application of the semen to the ovaries. Though it may be affirmed that these cases are morbid deflections from the common course of nature still it is highly probable that she employs no other method for animating the germ when it passes regularly through the tubes and is lodged in the cavity of the uterus

If it be conceded that the semen is necessary to the fecundation of the ova how can we explain its application to those bodies in extra uterine pregnancies if not through the medium of the fallopian tubes. X

Though many respectable and experienced experimentalists have never been able to distinguish semen in the fallopian tubes it is only a negative proof against a truth which has strong claims to probability. It behoves us then to receive all conclusions drawn from such a source as problematical.

A few well authenticated facts in support of any theory are sufficient to withstand a host of oppositions derived from a negative plan of reasoning.

Physick asserts (and we have no right to doubt his veracity) that among many other witnesses he himself discovered the semen frequently in the fallopian tubes. Morgagni has discovered it in the uterus of a sheep forty five minutes past coitus. Hunter also declares that (during his well known experiment) he perceived the semen pass perpaltane into the uterus.

Analogy also affords us a strong inducement to yield our belief to the verity of this doctrine. It is known to many that in some animals the contact of the semen with the germ is requisite for its animation and evolution. and the experiments of Spalanzani prove that a very small quantity only is requisite for the purpose.

Though the analogical facts derived from the animals above alluded to are not so satisfactory as if they bore a stronger resemblance in the anatomical structure of their organs and physiological character of their functions to the human species, we are inclined to believe that nature addopts the same method for the the completion of her favourite object in this last as in the former.